Concerning the equations (4.1), (4.2) and (4.3) it should be specified that they are valid when the domain is the whole $\mathbb{R}^n$. Otherwise one could take the function $x \mapsto x$ on the interval $[0,1]$, $s = 1$ and $r = 2$: although the second derivative vanishes, the first does not. So (4.3) is obviously wrong. But (4.1) is wrong as well since we can let $\varepsilon \to 0$. Similarly, taking $f(x) = g(x) = x$ one sees immediately that $[fg]_2 \neq 0$ and so (4.2) cannot be valid for $r = 2$. However the identities are applied on the whole $\mathbb{R}^n$, in fact for periodic maps (see for instance Proposition 4.1).